

- (a) a protective group reagent which reacts with a carboxylic acid or ester thereof and which also reacts with a phosphate group; and
- (b) a mild acid reagent for selectively regenerating any free phosphate groups in the peptide by reacting the protected peptides under sufficiently mild acid conditions such that the phosphoramidate bond is substantially cleaved and the amide bond is substantially not cleaved.

b1
cont

54. The kit of claim 53 wherein the protective group reagent is an amine.

55. The kit of claim 53 wherein the protective group reagent comprises differentially isotopically labeled protective groups.

b2

62. The kit of claim 56 wherein the label carries a reactive group that can form a covalent bond to a solid phase material and wherein the selectively labeled peptides are separated by first covalently attaching the labeled peptides to the solid phase material, then washing the solid support to remove peptides that are not covalently attached to the support and thereafter releasing peptides from the solid phase material.

b3

64. The kit of claim 63 further comprising a reagent for removing covalently linked phosphopeptides from a solid support.

b4

66. The kit of claim 53 which comprises:

- one or more enzymes for carrying out a peptide digest;
- one or more protective group reagents that react with carboxylic acid or carboxylic acid ester groups and with a phosphate group;
- one or more protective group reagents that react with the amine groups in the peptides;

one or more reagents for selectively cleaving a phosphoramidate bond in the presence of amide bonds to generate free phosphates; and
one or more labels which carry a functional group for selectively reacting with free phosphate groups.

67. The kit of claim 53 which comprises:

one or more enzymes for carrying out a peptide digest;
one or more protective group reagents that react with the amine groups in the peptides;
one or more protective group reagents that react with carboxylic acid or carboxylic acid ester groups and with a phosphate group;
one or more reagents for selectively cleaving a phosphoramidate bond in the presence of amide bonds to generate free phosphates; and
one or more linkers which carry a functional group for selectively reacting with free phosphate groups and carry a reactive group or a latent reactive group for reacting with a solid support material;
one or more solid support materials to which the reactive group or the latent reactive group can be attached; and
one or more reagents for cleaving a phosphopeptide from a solid support material.

72. The kit of claim 53 further comprising one or more protective group reagents that react with the amine groups in the peptides.

73. The kit of claim 72 wherein the protective group of the protective group reagent is t-boc or f-moc.--